

# GEOGRAPHIC NEWS BULLETINS

*Published Weekly by*

## THE NATIONAL GEOGRAPHIC SOCIETY

(The National Geographic Society is a scientific and educational Society, wholly altruistic, incorporated under the Federal law as a non-commercial institution for the increase of geographic knowledge and its popular diffusion.)

General Headquarters, Washington, D. C.



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### Contents for Week of October 23, 1933. Vol. XII. No. 16.

1. Havana, Strife-Torn Capital of Cuba.
  2. How Forests Affect America's Pocketbook.
  3. New Link in South America's Longest Highway.
  4. Danzig, the Most Extensive "City" in the World.
  5. Again Man Invades the Bluish-Purple Stratosphere.
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#### AMERICA'S FIRST LUMBERMAN

"Mickey the Beaver" is not exactly a "conservationist" when it comes to trees, but the dam he builds helps to check floodwaters at their source. Modern forestry not only enriches our natural timber resources but it also aids in flood control and in saving America's wild life (See Bulletin No. 2).

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#### HOW TEACHERS MAY OBTAIN THE BULLETINS

The Geographic News Bulletins are published weekly throughout the school year (thirty issues) and will be mailed to teachers for one year upon receipt of 25 cents (in stamps or money order). Entered as second-class matter, January 27, 1922, at the Post Office at Washington, D. C., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized February 9, 1922.

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### Havana, Strife-Torn Capital of Cuba

**A**LARGE, modern hotel became a fortress, sniper bullets spattered Havana's streets, and every business house, restaurant, bank, and newspaper office was closed on October 1, one of the darkest days in the history of the strife-torn capital of Cuba.

Because Havana to-day is under the glaring spotlight of world concern, many important facts about the city are being revealed daily. The average visitor or tourist has passed over them, satisfied perhaps to skim the froth from the gay night life, sports, souvenir shops, and the beaten paths of sightseeing tours.

#### About the Same Size as Washington

With its 600,000 inhabitants Havana may be compared in size with our own Washington. Its new Capitolio, or Capitol building, was designed somewhat along the lines of our own, yet the city as a whole, when viewed from the air, shows a striking resemblance to the physical aspect of New York's Manhattan Island area.

Havana harbor is known to ships of every nation, for many vessels trading with Central and South America, or en route through the Panama Canal to Far Western ports, call at the Cuban capital. There they find a safe expanse of water protected by a narrow, bottle-neck entrance, and are offered every port facility.

Speeding airplanes on regular schedules drop into the bay and slither to their anchorages in rainbow sprays of pontoon-scattered water, or kick up puffs of red dust as they spin their wheels on the landing fields outside the city. After short stops they dart away to other lands, cutting down to hours or days trips that once took weeks or months.

Hundreds of thousands of American visitors have viewed Havana's exotic charms in recent years. They have sat in little corner cafés or restaurants where wandering orchestras composed of children ten or twelve years old pause in the doorway and strike up a tune, while a pair of little dancers in costume darts in and does an infantile rumba among the tables, their tiny, serious faces solemnly intent on each other as they keep time to the music. After the dance a hat-passer seeks coins from the visiting diners.

#### Visitors Like "Maracas"

In normal times, peddlers with melodious cries advertise their wares in the streets. Vendors of souvenirs reap a golden harvest selling "maracas"—gourdlike rattles used in Cuban orchestras—at prices many times their value.

As sightseers stroll about the city, big modern buildings will stand before them shoulder to shoulder with structures of gray stone in age-old dignity; well-dressed and well-fed people will pass them on the streets, while a few steps farther on a ragged urchin will plead, "Meester, gim-mee wan cen"; views of spacious, cool rooms and patios or glimpses of tiny, cramped quarters will flash out at them as they pass open doors.

Newcomers to Havana will be surprised to find that a number of ancient structures built for religious uses now house government departments. The great rooms and cloisters of Santa Clara Convent, founded in 1635 by Clarisian nuns, and for centuries used by them, now resound to the tramp of heavy shoes and the sometimes strong language of engineers and clerks in the Department of Public Works. Historic Belén College, established in 1853, was turned over to the State Department when the college moved into new quarters in Marianao.

Riding along the tree-centered Prado, or, as it is now known, Paseo de Martí,

Bulletin No. 1, October 23, 1933 (over).



ONE OF THE CHIEF USES OF TIMBER IS IN NEWSPRINT

This giant paper machine in a Kalamazoo, Michigan, factory can convert liquid pulp into newspaper at the rate of a mile in five minutes. Our "metal civilization" draws upon the forests of the country for thousands of useful products, ranging from telegraph poles to clothespins (See Bulletin No. 2).

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### How Forests Affect America's Pocketbook

ARTICLES ranging from telegraph poles to clothespins are among the millions of objects made of wood which the present "metal civilization" needs to carry on daily life.

To protect and enrich our timber resources, and also to provide employment for those whose families are on relief rolls, some 300,000 young men are being reenlisted in the Civilian Conservation Corps, better known as the C.C.C. These men will continue the forestry, game-conservation and flood-control work done by the Corps in the six-months period ending October 1. About 550 new camps will be built, and 900 existing camps will be "winter-proofed" for the workers.

#### Lumbering and Forestry Are Not the Same

Even before the days of the President's "forest army," lumbering, measured by the number of persons engaged in it, was one of the nation's largest industries. Lumbering and forestry, as they are practiced at present, vary widely in their aims, although the cutting of wood is the main factor in both.

Lumbering is the term used for the cutting of timber for immediate sale, while forestry means long-time planning for a steady income. If trees are stripped carelessly from land, it is often left open to alternate floods and droughts. Much of it becomes worthless for farming or parkland and can support little animal life.

When white men came to America, there were over a million square miles of forest between the Atlantic Ocean and the prairies. In what is now the West of the United States there were some 220,000 square miles. This million and a quarter square miles of forests had been reduced to 733,554 square miles in 1928. Over half of this remainder had been well cut over, leaving the smaller trees for future growth. Of the original forests 126,875 square miles were cut so ruthlessly that the land is now nearly useless.

#### National Forests in Thirty-One States

To discourage further devastation of the country by thoughtless lumbering methods, the Government organized the Forest Service. The areas guarded by this service are the tree-covered public lands in the West which were not taken up by homesteaders, and forests purchased from private owners in the East. At present there are National Forests in 31 States. Camps for the unemployed in the National Forests of all these States were set up this summer. In States having no National Forests, similar camps were established in State Forests or on private land.

During the past quarter century, the Government has stressed the value of forests for the whole country. For the farmer—and the 1930 census showed over 50 per cent of the population living in rural areas—there are two great problems that are affected by forestry practice. One is erosion, or the washing away of the valuable top soil; the other is the distribution of rain water.

If there are no trees or cover crops to slow up the rain water as it runs down the slopes, erosion follows. Thus water which should seep down to the valleys through a period of weeks rushes in torrents down the stream beds, causing floods in the valleys, followed by long periods of drought.

#### Timber a Paying Investment

Aside from the protection of farm lands and conservation of moisture, National Forests bring the Government a direct revenue in various ways. Full-grown timber and cord wood are sold, grazing lands are rented, water power sites are leased, drinking water is furnished large cities, and irrigating systems are provided. These projects have proved so profitable that even with the expense of seeding new sections, and pruning, thinning, and clearing underbrush in the older growths, many of the National Forests have been put on a self-supporting basis. Some National Forests contribute a cash surplus to the treasuries of counties and States in which they are situated.

Perhaps the largest single item of expense in forestry is fire prevention. The toll of life is not ordinarily great, deaths from forest fires rarely running over 50 persons a year (the recent brush fire near Los Angeles, with a death toll of 27, was the most disastrous in some time); but the damage to forests and water districts has been found to amount to millions of

and out along the Malecón (Avenida de Antonio Maceo), visitors will pass the orphan asylum, the site of the old San Lazaro leper hospital, and come to the memorial erected to the victims of the Maine disaster. If it is near sunset, they will see at its best the broad, sea-fronting boulevard and the curving shore of vicious-looking rocks, forming a foreground for Morro Castle.

It may not be generally known that Havana is the third capital of Cuba. The first was at Baracoa, on the northern coast of the island near its easternmost tip, established by Diego de Velázquez in 1512. In 1514 Velázquez transferred his headquarters to Santiago, which remained the second capital of the island until 1551. Meanwhile the original Havana was founded on July 25, 1514, near the site of what is now known as the town of Batabanó, on the south coast, entirely across the island from the capital city of to-day. The infant city bore the lengthy title of "San Cristóbal de la Habana."

On one of his voyages in 1519 Velázquez beached his ships in what is now Havana Harbor. Finding that this site met the needs of the Spaniards, he ordered the transfer of the settlement at Batabanó. The transplanted settlement grew into present-day Havana, but government offices were not transferred to the new city officially (from Santiago) until 1551.

Note: Economic geography and current events classes wishing more detailed descriptions and new photographs of Havana and Cuba should also consult: "Cuba—The Isle of Romance," *National Geographic Magazine*, September, 1933; "Some Impressions of 150,000 Miles of Travel," May, 1930; "By Seaplane to Six Continents," September, 1928; "To Bogotá and Back by Air," May, 1928; "How Latin America Looks from the Air," October, 1927; "On the Shores of the Caribbean," February, 1922; "Across the Equator with the American Navy," June, 1921; and "Cuba—the Sugar Mill of the Antilles," July, 1920.

See also in the GEOGRAPHIC NEWS BULLETIN: "Cuba, Island of Sugar, Tobacco, and Unrest," week of October 2, 1933; and "Camagüey, Moorish City in the Heart of Cuba," week of October 9, 1933.

Bulletin No. 1, October 23, 1933.



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#### "ANY FRESH FRUIT TO-DAY, SEÑORA?"

Rolling, one-man markets bring (in season) bananas, oranges, limes, pineapples, mangos, pomegranates, avocados, guavas, and other tropical fruits to the doorsteps of Havana's older residential streets. Each street vendor has a special cry or noise, such as bell, whistle, or triangle, to announce his trade. Some of the calls are quite melodious—if heard from a distance!

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### New Link in South America's Longest Highway

**O**PENING to traffic of a 400-mile section of graded roadway between Quito, Ecuador, and Popayan, Colombia, brings nearer to completion South America's longest modern road project.

The entire road, for which the name "Simón Bolívar Highway" has been proposed, will swing in a 2,300-mile arc across Venezuela, Colombia, and Ecuador, the heart of the region which Simón Bolívar, South American liberator, freed from Spanish rule.

#### Crosses Many Mountain Ranges

Placed on a map of the United States, the new South American highway would extend from Seattle to Milwaukee. In its actual position it crosses an even greater expanse of mountainous country than is to be found between these two North American cities.

From La Guaira, Venezuelan port on the Caribbean, the road twists and wriggles up the face of a mountain range that rises almost sheer from the sea to reach Caracas, capital of Venezuela. Thence it strikes inland, hurdles the watershed between Venezuela and Colombia near Cúcuta, and reaches Bogotá, the mountain-girt capital of Colombia.

Southwest of Bogotá the highway picks up the line of the proposed Pan-American Highway near Cali, and runs southward along it through Popayan to Quito, capital of Ecuador. The last section drops to tidewater again at Guayaquil, the port of Ecuador on the Pacific.

#### Most of It Open to Traffic

Along this 2,300-mile artery more than 2,100 miles have already been opened to traffic. A few sections are paved, others have a crushed rock or gravel surface, but most of the route is graded earth. In general the highway follows the old Spanish and Indian trails of northwestern South America, and it touches many important towns that date back to Spanish colonial days.

Of the incomplete segments, totaling less than 200 miles, more than half the mileage is in Colombia and the rest in Ecuador. Venezuela has finished its part of the highway from La Guaira to the Colombian border. Because part of the route in Colombia was used for military purposes during the Leticia incident, the Colombian sections have been under active construction and should soon be completed for traffic.

The new Simón Bolívar Highway will not only open virgin regions to trade and tourist travel, but it will strengthen economic and social ties between three sister republics in a region that is almost as large as the portion of the United States east of the Mississippi. Travel between the three republics of northwestern South America has long been difficult because the area is broken by the great Cordilleras of the Andes into distinct geographical units.

#### Will Link Three Capitals

In the past the rivers leading to the sea, rough trails, a few short stretches of railway along the river courses and, more recently, airplane lines, have been the only trade routes. It was easier to make a journey to the United States or to Europe than to travel overland from one of the three nations to another.

The new highway will not only bring the three capitals—Caracas, of Venezuela, Bogotá, of Colombia, and Quito, of Ecuador—within close touch of each other, but it will also provide a connecting link between seven Venezuelan States, nine Colombian Departments, and nine Ecuadorian Provinces.

In Venezuela the new highway taps the "horseshoe" of lowlands around Lake Maracaibo, a region of rich sugar cane, cacao, coffee and tobacco plantations, and it will also provide an outlet for the cattle ranches of the interior. In the Valley of Aragua, called by Humboldt "The Garden of Venezuela," the road passes near the famous battlefield at Carabobo, on which Bolívar fought two battles, the second, June 24, 1821, resulting in the independence of Venezuela. The new highway touches several other Venezuelan and Colombian districts that were scenes of engagements in which the "Liberator" took part.

Rich deposits of minerals, including gold, silver, platinum, and copper, will find a new outlet when the Colombian sections of the highway are completed. Bogotá, which has been the most remote of South American capitals, will be opened to tourist travel by road. Founded only forty years after the first voyage of Columbus, Bogotá retains a wealth of historic memories

dollars. To avoid this loss lookouts are placed on high points of National Forests and constant watch is kept for the telltale smoke.

Forest rangers now frequently are successful in beating out fires before they have passed the possibility of control. Public education has done much to limit the horror and waste of these fires; but one unavoidable cause, lightning, accounts for more than 25 per cent of the fires.

### Forest Playgrounds Popular

The Forest Service has been quick to see the playground possibilities of the forests, and roads have been built, hiking clubs encouraged, lake shores cleared, trails broken, and camping grounds established, so that tourists, climbers, fishermen, and hunters may have a chance to indulge in their favorite sports. Summer home sites have been leased in a number of the forests for those who wish to live a more settled life in the woods. Botanists and zoölogists have keenly supported the forestry movement, so that rare plants and animals might be preserved (see illustration on page 1).

The Forest Service has taken with it roads, telephones, and radios, and has brought life and prosperity to lonely spots, many of them of striking scenic beauty. It has given a new vision to many lumbermen, persuading them that ultimate good for the country can be achieved and great harm averted by following the ideals of forestry instead of those of lumbering.

Note: For additional pictures of forests, forest fires, lumbering, forest game life, and the making of various products from wood see: "New Jersey Now!" *National Geographic Magazine*, May, 1933; "Washington, the Evergreen State," February, 1933; "Colorado, a Barrier That Became a Goal," also "Dismal Swamp in Legend and History," July, 1932; "New Hampshire, the Granite State," September, 1931; "Mickey the Beaver," December, 1928; "Michigan, Mistress of the Lakes," March, 1928; "Seeing America with Lindbergh," January, 1928; "The Green Mountain State (Vermont)," March, 1927; "The Fight at the Timberline," August, 1922; "The Scenery of North America," April, 1922; "A Mind's-Eye Map of America," and "Saving the Redwoods," June, 1920; "Our Big Trees Saved," January, 1917; and "The Land of the Best," April, 1916.

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### HOW TREES ARE PLANTED IN A NEW HAMPSHIRE FOREST NURSERY

Workmen use a long board in which tiny Douglas fir seedlings are held at an equal distance apart. After the device has been lowered into a prepared trench the board is removed. These nurseries grow young trees, such as pine, elm, maple, etc., for sale to citizens of the Granite State or for transplanting to the State's own forest preserves and along its highways. Scores of similar nurseries throughout the country provide seedlings which are transplanted by the President's "forest army" in our forest reserves.

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### Danzig, the Most Extensive "City" in the World

**T**HE Free City of Danzig, trouble spot of the Baltic, has reached an understanding with its big neighbor Poland.

Agreeing to give Polish-speaking residents equal rights with others in the Free City, Danzig has received in return Poland's promise to divide its overseas trade equally between Danzig and the new Polish port of Gdynia.

Geographical position has been the chief reason for Danzig's seesaw periods of prosperity and trouble. The city lies at the junction of the Mottlau and Vistula rivers, four miles from one of the safest harbors of the Baltic Sea.

#### Logical Outlet for Many Nations

To the south, west, and east stretches a vast hinterland, drained by the Vistula, with her branches and canals. Germany, Lithuania, the Ukraine, and especially Poland, have for centuries shipped coal, timber, grain, and sugar from the port of Danzig, in exchange for large imports of foodstuffs, raw textiles, and minerals.

The city, however, has been a continual bone of contention for northern Europe, lying as it does between Poland and the sea, and between East and West Prussia. After stormy years, during which it was variously held by Pomerania, Poland, Brandenburg, and Denmark, Danzig rose to her first period of prosperity under the Teutonic knights of the Middle Ages.

The churches and halls built during this era preserve the stern, square character of medieval architecture. The Church of St. Mary with its massive, blunt tower, surrounded by delicate spires, is a fine example of the brick Gothic of the Baltic.

In the Artushof (Arthur's Court), the knights kept alive the Round Table traditions, even holding tournaments in the city square. The projecting stories of the old wooden crane "gate," used in unloading and repairing ships, still hang over the river. On an island opposite stand the black and white, half-timbered granaries that held the wealth of medieval merchants.

#### City Was a Leader in Hanseatic League

In the fifteenth and sixteenth centuries, as a free city under the protection of Poland, Danzig became one of the four leading towns of the Hanseatic League. The fine old patrician houses that line the Langgasse, main street of the town, were built at this time. Their narrow façades, elaborately decorated with figures and mottoes, show how the influence of the Italian Renaissance reached even this northern region.

In the second partition of Poland (1793), Danzig was awarded to Prussia. In 1807 Napoleon declared it a free town, but seven years later it was returned to Prussia with its trade badly cut. After that it remained the capital of West Prussia until the close of the World War.

The Free City of Danzig was established in November, 1920, under the Treaty of Versailles, with its own Popular Assembly and Senate. The latter is the highest state authority and its meetings are closed to the public. A Customs Union and Economic Union give to Poland free use of the port, control of the

and many quaint old Spanish homes with iron-barred windows and central patios filled with tropical flowers.

### **Emerald Mines and Panama Hats!**

Near Bogotá also are the Muzo mines, the world's chief source of emeralds; and the salt pits of Zipaquirá, whose immense underground galleries are lighted by electricity.

In Ecuador the new trunk road passes through mountain villages where the best Panama hats are made. Passable motor roads now extend in every direction from Quito, which is situated nearly two miles above sea level. The streets of the capital are filled with motor cars, although a section of the mountain road linking it with the sea has not yet been finished.

Cars are ferried on river-boats from the present terminus of the road to Guayaquil. This seaport offers another historic association with Simón Bolívar. Here, in 1822, took place the meeting between Bolívar and San Martín, father of the independence of Argentina and Chile, and "Protector" of Peru.

Note: National Geographic Society explorers and writers have visited much of the territory reached by the new highway. For supplementary reading and photographs see: "In Humboldt's Wake (Venezuela)," *National Geographic Magazine*, November, 1931; "Skypaths Through Latin America," January, 1931; "Buenos Aires to Washington by Horse," February, 1929; "Volcanoes of Ecuador, Guideposts in Crossing South America," January, 1929; "To Bogotá and Back by Air," May, 1928; "How Latin America Looks from the Air," October, 1927; "Round About Bogotá (Colombia)," February, 1926; and "Over the Andes to Bogotá," "Over Trail and Through Jungle in Ecuador," and "The New Map of South America," October, 1921.

Bound volumes of the *National Geographic Magazine* may be consulted in your school or local library.

**Bulletin No. 3, October 23, 1933.**



*Photograph by Wilson Popenoe*

### **PART OF THE OLD SPANISH ROAD ACROSS THE ANDES**

During the days of Spanish colonial rule an excellent paved road (not passable for wheeled vehicles) was built from Bogotá, the capital of Colombia, to Honda, on the Magdalena River, whence seaports on the Caribbean could be reached by boat. Part of the new Simón Bolívar Highway runs near this old trade route, now seldom used except by Indian mule trains.

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### Again Man Invades the Bluish-Purple Stratosphere

NEWS dispatches from Soviet Russia describe the record ascent of three Soviet balloonists into that little known region called the stratosphere.

Unofficial reports state that the Soviet balloon attained an altitude of 11.8 miles above the earth's surface, the greatest height ever reached by man. The new record is about a mile and three-quarters above that set by Professor Auguste Piccard, the Belgian scientist, on August 18, 1932, and two miles above Prof. Piccard's 1931 record (see diagram, next page).

#### What Is the Troposphere?

In a special communication to the National Geographic Society, Professor Piccard defines the two major divisions of the atmosphere and tells what the earth looks like from a great height.

"Meteorologists divide the atmosphere into two parts," he writes. "Below is the troposphere, that portion of the atmosphere which is exposed to the vertical currents by differences in the earth's temperature.

"In rising, the air cools, and this is the cause of various phenomena such as clouds, rain, snow, storms, and the wind currents, which are obstacles for the aviator. In rising and cooling, these currents lose their force. When a temperature of 58 to 76 degrees below zero, Fahrenheit, is attained, they are exhausted. They do not rise any higher.

#### Region of Always Fair Weather

"The stratosphere is the region of eternally fair weather, but also the region of very cold weather. The sky is beautiful up there—almost black. It is a bluish purple—a deep violet shade—ten times darker than on earth, but it still is not quite dark enough to see the stars. The sun, however, seems brighter than when seen from sea level.

"Forests, rivers, and fields are visible, sometimes through a light mist without any contrast, but on other days with marvelous beauty in striking relief. The towering summits of the Alps from ten miles up assume the aspect of sand-table toy mountains. Calculation shows that, if there were no mist, a circle of earth having a diameter of 560 miles would be visible. That is equal to a surface of 250,000 square miles.

"A balloon is used in flights to the stratosphere because planes have not yet been fully adapted to such high altitudes. For research purposes the balloon offers the tremendous advantage of not being exposed to the vibrations and magnetic effects of a motor. A number of delicate instruments can be employed in a balloon that could not survive an airplane voyage.

"At the take-off on a stratosphere flight the big balloon is only one-fifth filled with hydrogen, and looks like a big mushroom. The gas in the bag gradually expands as the balloon rises and when the stratosphere is reached it is a perfect sphere."

Note: For graphic descriptions of two previous flights to the stratosphere, as well as photographs and data about equipment used in studying this region, see: "Ballooning in the Stratosphere," *National Geographic Magazine*, March, 1933; and "Exploring the Earth's Stratosphere," December, 1926. Another noteworthy altitude flight is described in: "The Aërial Conquest of Everest," August, 1933.

Bulletin No. 5, October 23, 1933 (over).

railways, and control of foreign affairs. A high commissioner appointed by the League of Nations is stationed in the city to decide all points of dispute arising between Poland and Danzig. Both, however, have the right to appeal to the League.

### Most of Its Citizens Are Germans

Danzig is a Free City, not a Free State, which makes it the most extensive city in the world with approximately thirty-four times the area of Manhattan Island. Of the 407,517 inhabitants, 96 per cent are German. The official language also is German; but the currency is independent, based on the gulden, which is equal to one twenty-fifth of a pound sterling, at its normal value. The flag is red, with two white crosses surmounted by a golden crown.

Danzig's latest worry has been Gdynia, a thriving port which Poland built on the coast of the Polish Corridor, 13 miles distant. Where ten years ago were sandy marshes and a few fishermen's huts, to-day stands a modern city of 40,000 inhabitants, with all the glare and bustle of a frontier town. Gdynia has been developed not only as a seaport, but as a yachting base and bathing resort as well.

Note: For additional material about Danzig see: "Looking Down on Europe," *National Geographic Magazine*, March, 1925; "The Geography of Our Foreign Trade," January, 1922; "The League of Nations, What It Means and Why It Must Be," January, 1919; "The New Map of Europe," February, 1921.

See also: "Poland of the Present," *National Geographic Magazine*, March, 1933; "Struggling Poland," August, 1926; and "Partitioned Poland," January, 1915.

Bulletin No. 4, October 23, 1933.



Photograph by Wilson-Pain

### NO MACHINE HAS YET REPLACED THE SKILL OF THE SAWYER

Mighty woodsmen measure their brawn and endurance at the annual "Rolleo" in Longview, Washington. Lumbering, measured by the number of people engaged in it, is one of the nation's largest industries, and, judging by the physical fitness of its axmen, tree-toppers, "birlers," and sawyers, it is one of the most healthful (See Bulletin No. 2).



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#### RECORD "HIGHS" OF BOTH EARTH AND MAN

The black line a quarter of an inch above the top of the diagram indicates the new altitude record set by the Soviet Russian aviators last month. Because the stratosphere is free from snow, rain, clouds, or frost, some scientists believe that the routes of swift aerial travel in the future will be through this outer sheath of the earth's atmosphere.

